III. **Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.; B. F. SINE, Principal Capon Bridge Normal School; Capon Bridge, W. Va.; J. D. CRAIG, Frankfort, N. J.; and MARTIN SPINX, Wilmington, O.**

Since the two hands had precisely changed positions, they together had passed over all the spaces on the dial-face ; but, as the minute-hand always goes through 60 spaces while the hour-hand goes through 5, both go through 65.

$\therefore\ 65:5=60:4\frac{8}{13}$.

$\therefore\ 4\frac{8}{13}$ spaces is the number of spaces passed over by the hour-hand. This is also the distance the minute-hand was in advance of the hour-hand in the first position.

Since the time he left at noon was after 12 o'clock and since the minute-hand always gains 55 minutes in 60 minutes, to gain $4\frac{8}{13}$ minutes we have $55:60=4\frac{8}{13}:5\frac{5}{143}$.

$\therefore$ The time was $5\frac{5}{143}$ minutes after 12 o'clock. In the second position, the hour-hand was $4\frac{8}{13}$ minutes in advance of the minute-hand. $5\frac{5}{143}-4\frac{8}{13}=\frac{60}{143}$ minutes.

$\therefore$ The time was $\frac{60}{143}$ minutes after 1 o'clock.

$\therefore$ He left at 5 minutes $2\frac{14}{143}$ seconds after 12 o'clock, and returned at $25\frac{35}{143}$ seconds after 1 o'clock.

Also solved by *W. F. BRADBURY*, *J. W. YOUNG*, *WALTER H. DRANE*, *ELMER SCHUYLER*, and *ALOIS F. KOVARIK*

ALGEBRA.

89. **Proposed by G. A. MILLER, Ph. D., Instructor in Mathematics, Cornell University, Ithica, N. Y.**

Solve by quadratics, $x^2+y=7\ldots\ldots(1)$,
$x+y^2=11\ldots\ldots(2)$.

XI. **Solution by W. A. HARSHBARGER, A. M., Professor of Mathematics, Washburn College, Topeka, Kas.**

$y^2+x=11\ldots\ldots(1),\ y+x^2=7\ldots\ldots(2)$.

$(1)-(2)\ (y^2-x^2)-(y-x)=4\ldots\ldots(3)$.

Put $(y+x)=a$, and $(y-x)=b$.

Then by substituting in (3), $ab-b=4\ldots\ldots(4)$.

$\therefore\ a^2b^2=16+8b+b^2\ldots\ldots(5)$.

Subtract, $10ab=40+10b$..

$\therefore\ a^2b^2-10ab=-24-2b+b^2\ldots\ldots(6)$, and

$a^2b^2-10ab+25=1-2b+b^2\ldots\ldots(7)$.

$\therefore\ ab-5=1-b,\ ab+b=6\ldots\ldots(8)$. $(4)+(8)$, $ab=5$; $(4)-(8)$, $b=1$.

$\therefore\ a=5$. $\therefore\ y+x=5$, and $y-x=1$. $\therefore\ x=2$, and $y=3$.

[NOTE. Professor Harshbarger says the above solution appeared in one of the scientific journals a few years ago, but he has forgotton the name of the author.]